IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF

Applicants:	Yin L. Cheung, Michael J. Zeitlin, and Mark Acosta	**Attorney Docket No.:**	33849-8
Serial No.:	10/806,980	**Art Unit:**	2628
Filed:	March 22, 2004	**Conf. No.:**	2205
For:	System and method for analyzing and imaging three-dimensional volume data sets using a three-dimensional sampling probe	**Examiner:**	Phu K. Nguyen

APPELLANT'S REPLY BRIEF

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Appellant's Reply Brief is submitted in support of the appeal from the final rejection of

U.S. Patent Application Serial Number 10/806,980 (the "'980 Application"), and responds to the

points raised in the Examiner's Answer mailed on January 27, 2009.

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ARGUMENT

A. The *Holden* Subvolume is not Redrawn as it is Moved.

Significantly, the Examiner's Answer ignores the fact that the *Holden* GeoSeed and TumbleView features teach away from the limitations of independent claims 1, 21, 24, 27, 47 and 50. Appellant's Brief, pp. 20-25. Instead, the Examiner's Answer cobbles together additional features in *Holden* in an effort to meet the limitations of these claims. As demonstrated herein, the Examiner's reliance on such features is misplaced.

The Examiner, now, relies heavily on Chapter 9 ("Editing the Volume") to support the rejection of claims 1, 21, 24, 27, 47 and 50. In particular, the Examiner argues that manipulating the position of the *Holden* orthogonal planes "creates images of the 3D sampling probe as the 3D sampling probe is moved (*i.e.*, located at different positions) within the 3D volume." Examiner's Answer, pp. 10-11. In support of this argument, the Examiner relies on pages 9-1, 9-19 and 9-21 in *Holden*.

Although *Holden* refers to subvolumes and the use of orthogonal planes to subset the volume data into subvolumes, there is no reference in *Holden* to a sampling probe as suggested by the Examiner's Answer. Moreover, *Holden*'s subvolume does not operate in the same manner as the claimed sampling probe. For example, the figure on page 9-21 in *Holden* illustrates the use of orthogonal planes to edit the volume. As illustrated by this figure, the viewpoint in the image window on the right is independent of the viewpoint in the rendering window on the left. *Holden*, p. 9-19. To temporarily remove a portion of the volume along the x-axis, the slide bars are moved in the slider bar window. *Holden*, p. 9-22. The starting location slider bar may be moved to the right or the ending location slider bar may be moved to the left. *Id.* The y-axis and z-axis may be edited in the same manner. *Id.* Whenever the mouse is released after moving one of the slide bars, the image in the rendering window will re-render

with the edited volume. *Id.* The results of the edited subvolume therefore, cannot be seen until the slider bar is released and the image is re-rendered (redrawn). At most, *Holden* teaches that the image of the subvolume is redrawn in the rendering window after it is moved – not as it is moved.

More importantly, however, movement of the *Holden* subvolume through the 3D volume from one location to another location would require independently editing an orthogonal plane along each axis (x, y, z) and waiting for each orthogonal plane to render the subvolume at its new location – one orthogonal plane at a time. Due to its limited functionality, *Holden* is only capable of revealing an image of the subvolume data at a new location after the subvolume is reconstructed at the new location. This is a significant disadvantage in the prior art because observing how the subvolume data changes between locations improves the context in which the subvolume data is observed. For example, if the *Holden* subvolume were moved through the 3D volume from one location back to the same location, then the subvolume data would look the same because the image of the subvolume is only redrawn after it is moved. In other words, *Holden* does not redraw an image of the subvolume as it is edited or moved through the 3D volume from one location to another location.

Conceding that the *Holden* subvolume described in Chapter 9 does not operate in the same manner as the claimed sampling probe, the Examiner borrows functionality from Chapter 5 ("VoxelGeo's User Interface") to argue that *Holden*'s subvolume in Chapter 9 is "equivalent to the claimed 'image of the 3D sampling probe is redrawn as the 3D sampling probe is moved'." Examiner's Answer, pp. 11-12. The Examiner relies on page 5-2 in *Holden*, which generally describes several parameter setting features. In particular, two or more parameter setting features (opacity, contrast, color, etc.) can be open and active at the same time. *Id.* Several user

interface windows for corresponding rendering parameters therefore, may be open on the screen at the same time. *Id.* Although *Holden* does teach that adjustments may be made to the several rendering parameters, and the results of such adjustments may be viewed in the rendered image immediately, adjustments to rendering parameters are not equivalent to moving a subvolume – much less from one location in the 3D volume to another location in the 3D volume. In other words, adjusting opacity, contrast, color, etc. for a particular subvolume does not necessarily involve movement of the subvolume.

Even assuming, *arguendo*, that adjusting opacity, contrast, color, etc. for a particular subvolume may involve movement of the subvolume, it is clear that adjusting the rendering parameters is subject to the same restrictions as editing or moving the subvolume. For example, the figure on page 5-9 in *Holden* illustrates the use of a slider bar to adjust the parameter settings. To operate the slider bar, the cursor is placed on the red slider. *Holden*, pp. 5-8 and 5-9. Press and hold down the left mouse and then move the mouse to the right or left. *Id.* As the slider bar is moved, the numerical value of the parameter setting will change. *Id.* After reaching the desired setting, the mouse button is released, and the image will re-render. *Id.* When operating the slider bar, the rendering will freeze. *Id.*

Holden therefore, does not teach or suggest the limitation of independent claims 1, 21, 24, 27, 47 and 50, which requires "repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume so that as the 3D sampling probe(s) move through the 3D volume, the image of the 3D sampling probe(s) is redrawn ... as the 3D sampling probe is moved." Furthermore, the Examiner's Answer fails to explain or support why redrawing the *Holden* subvolume in the rendering window <u>after</u> it is moved is equivalent to redrawing the

claimed sampling probe <u>as</u> it is moved. As demonstrated herein, the two operations are significantly different – not equivalent.

B. Because the *Holden* Subvolume is not Redrawn as it is Moved, it is Neither Redrawn Substantially at the Same Time nor Sufficiently Fast to be Perceived in Real Time as it is Moved.

In a confusing argument, the Examiner suggests that "the claimed '3D sampling probe is moved,' is interpreted as *Holden*'s action including 'press and hold the left mouse, then move the mouse to the desired setting, release the mouse button,' not during pressing and moving the mouse." Examiner's Answer, p. 13. Without the benefit of any further explanation, it appears that the Examiner may be arguing that use of the mouse to move the slider bar(s) is considered moving the claimed 3D sampling probe. Even assuming, *arguendo*, the Examiner's interpretation is correct, the Examiner conveniently overlooks the rest of the limitation, which requires "repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume so that as the 3D sampling probe(s) move through the 3D volume, the image of the 3D sampling probe(s) is redrawn [substantially at the same time or sufficiently fast to be perceived in real time] as the 3D sampling probe is moved." *Holden*, conversely, states that the image of the edited subvolume is not re-rendered (redrawn) until the mouse is released after moving one of the slider bars. *Holden*, p. 9-22. *Holden* therefore, fails to teach or suggest redrawing an image of the sampling probe as it moves through the 3D volume from one location to another location – much less substantially at the same time or sufficiently fast to be perceived in real time as the 3D sampling probe is moved.

Realizing the claimed invention requires more than just moving the sampling probe, the Examiner relies on yet another feature in Chapter 5. In particular, the Examiner relies on the description of a double buffer feature that uses an animation technique. *Holden*, p. 5-10. The Examiner's reliance on this feature, however, is equally misplaced because the double buffer

feature is applied to parameter settings. *Id.* Using this feature, rendering is done in the background and each new image is then redrawn on the screen with the new (parameter) setting in effect. *Id.* The slider bar may be moved across its entire range to quickly view the range of change at regular intervals without releasing the mouse and letting the image re-render at various points. *Id.* This technique therefore, applies to the adjustment of parameter settings using a slider bar – not moving a subvolume. Moreover, rendering is done in the background before moving the slider bar. The image therefore, is not drawn in response to movement of the slider bar – much less in response to movement of a subvolume.

Holden therefore, does not teach or suggest the limitation of independent claims 1, 21, 24, 27, 47 and 50, which requires "repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume so that as the 3D sampling probe(s) move the 3D volume, the image of the 3D sampling probe(s) is redrawn [substantially at the same time or sufficiently fast to be perceive in real time] as the 3D sampling probe is moved."

C. The Examiner Erroneously Distinguishes the Term Redrawn in Claims 1, 3, 27 and 29.

The term "redrawn" is recited in independent claims 1 and 27, which means repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume. Claims 3 and 29, which depend from claims 1 and 27, respectively, recite that "the image of the 3D sampling probe(s) is redrawn at a frame rate of at least about 10 to 15 frames per second." Because the same term (redrawn) is used in claims 1, 3, 27 and 29, it is presumed that it should be given the same meaning in each claim unless it is clear from the specification and prosecution history that the term has different meanings in different claims. *Finn Control Sys. Pty., Ltd. v. OAM, Inc.*, 265 F.3d 1311, 1318 (Fed.Cir. 2001).

The limitations in claims 3 and 29 therefore, define how fast the drawing step must be repeated in response to movement of the 3D sampling probe through the 3D volume. Realizing *Holden* does not supply this limitation, the Examiner argues that "the claimed '10-15 frames per second' of claim 3 and 29 would have been a mere design choice because it depends on the processing speed of the system as well as the size of the displayed volume." Examiner's Answer, p. 14. The claimed frame rate, however, is more than a mere design choice – it is crucial to defining exactly how fast the drawing step must be repeated in response to movement of the 3D sampling probe. Moreover, the Examiner does not explain why or how *Holden*, or the general knowledge of the art, provides any teaching, suggestion or motivation to modify the *Holden* subvolume in order to produce the claimed sampling probe and frame rate.

CONCLUSION

As demonstrated herein and in Appellant's Brief, *Holden* simply does not teach each and every limitation of the claims at issue. In fact, *Holden* teaches away from such limitations. Therefore, one of ordinary skill in the art at the time of the invention, would not have been motivated by *Holden* to modify the *Holden* subvolume as proposed by the Examiner.

Accordingly, Applicant respectfully requests that the Board reverse the Examiner's rejection of claims 1-52.

The Commissioner is hereby authorized to charge any amount required, or credit any overpayment, to Deposit Account No. 50,3385

Respectfully submitted,

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